(12) UK Patent Application (19) GB (11) 2 173 720 A

(43) Application published 22 Oct 1986

(21) Application No 8610182

(22) Date of filing 16 Jan 1986

(30) Priority data

(31) 8501126 (32) 17 Jan 1985 (33) GB
8514118 4 Jun 1985

(51) INT CL[4]
B23B 31/19

(52) Domestic classification (Edition H):
B3B HC29

(56) Documents cited
GB 1592064 GB 0583004
GB 0688429 US 4527809

(58) Field of search
B3B
Selected US specifications from IPC sub-class B23B

(71) Applicant
Roger David Harrison,
129 Newbridge Road, Bath, Avon BA1 3HJ

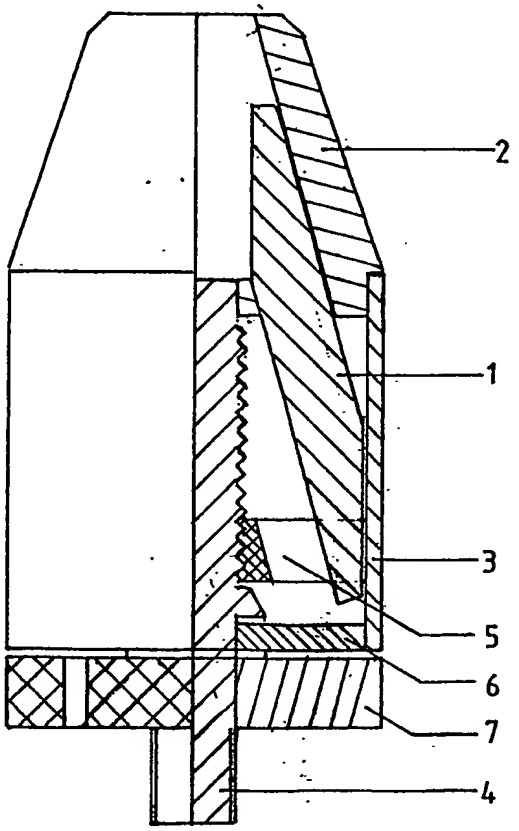
(72) Inventor
Roger David Harrison

(74) Agent and/or Address for Service
Roger David Harrison, 129 Newbridge Road, Bath,
Avon BA1 3HJ

(54) Keyless chuck

(57) In a keyless drill chuck which is self-tightening, the jaws are opened and closed by a drive plate 5 or nut operated by a threaded spindle 4 which is driven by the driving machine and transmits drive from the driving machine to the tool via a rotationally fast connection between the drive plate and an outer sleeve-like body member 3.

FIGURE 1



GB 2 173 720 A

2173720

FIGURE 1

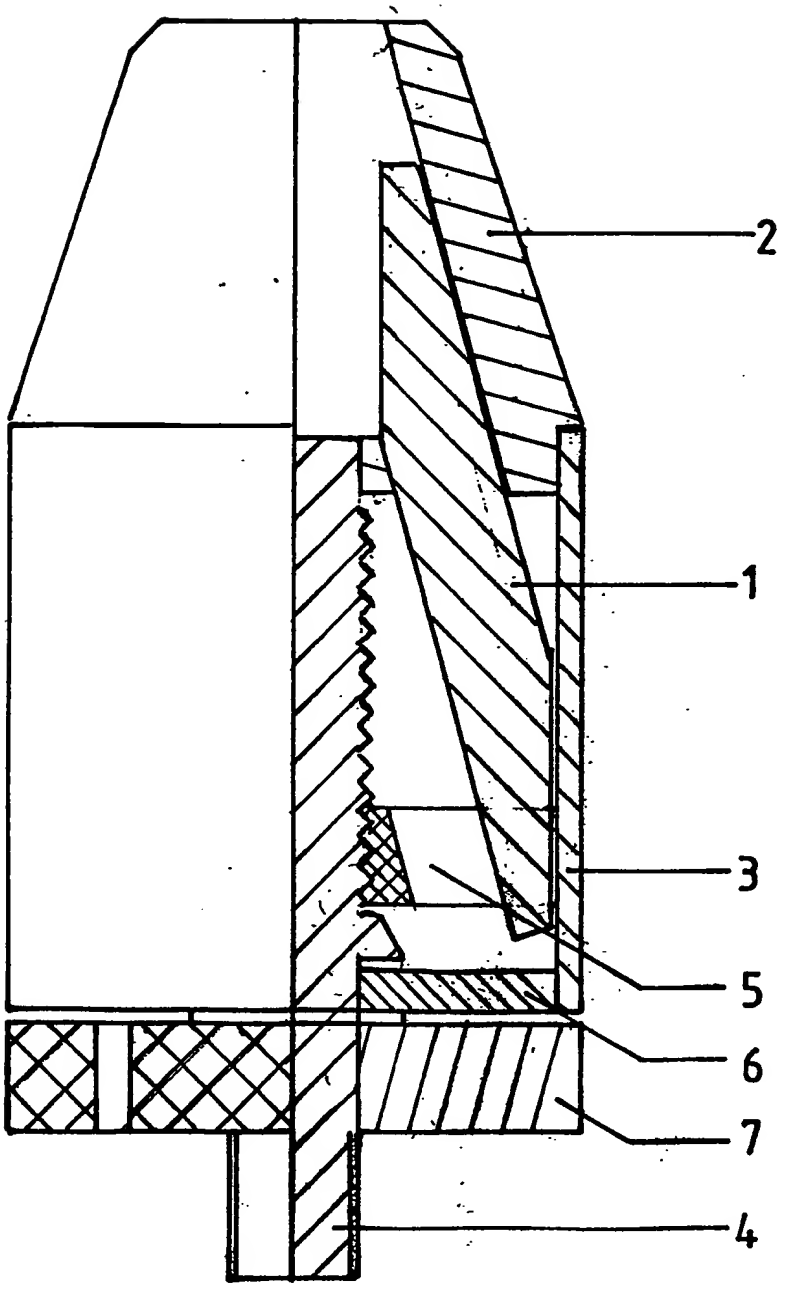
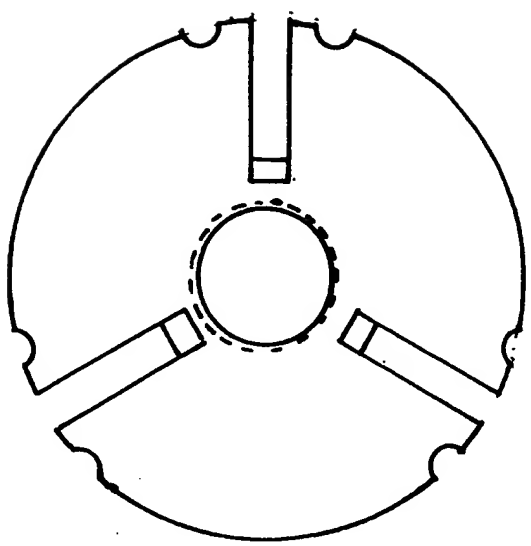


FIGURE 2



SPECIFICATION

Keyless chuck

This invention relates to a keyless self-tightening chuck.

Keyless chucks for parallel shank drills and other rotary tools use the torque transmitted through the chuck during use to tighten the grip of the jaws on the tool. After initial tightening by the user the chuck tightens itself as it transmits torque from the machine to the tool. The degree of tightening depends on the transmitted torque so that it does not slip. There are keyless chucks where the mechanical advantage usually provided by the key is incorporated in the chuck itself but these are not self-tightening.

Keyless self-tightening chucks are expensive when compared with equivalent capacity conventional three-jawed geared chucks. This is due to an increased complexity and, or number of components.

In this design the torque is transmitted through the spindle to the drive plate and then to the body of the machine. This in turn drives the jaws, so the jaws are forced forward directly by the drive plate on tightening. The torque is transmitted through the drive plate to the body and nose and then to the jaws.

To use the chuck the body is rotated relative to the hand release wheel in an anticlockwise direction viewed from the jaws. This opens the jaws; when sufficiently open the tool is inserted between the jaws and the body rotated in the opposite direction closing the jaws on the tool. Once the jaws are lightly tightened onto the tool the chuck will tighten itself to prevent slipping when torque is applied to the spindle by the driving machine. After use the tool is released by opening the jaws as previously described.

As the jaws are tightened the spindle rotates in the body screwing the drive plate forwards. The reactionary force is taken by the rear bearing. The drive plate is prevented from rotating by the main body which has ridges running along its length. These ridges mesh into slots in the drive plate. The drive plate has three more radial slots which mesh with the cutaway sections on the jaws, consequently the jaws can slide in a radial manner in the drive plate but are laterally fixed to the drive plate.

The torque is transmitted through the spindle to the drive plate and then to the body of the machine. This in turn drives the jaws, so that the jaws are only forced forward directly by the drive plate on tightening.

The chuck is made up of the following components referred to by numbers in Figure 1:

1/ Jaws: Machined from a round section they subtend an angle of 15 degrees with the axis of the chuck. The tool gripping end is a similar form to a common three-jawed chuck. Two slots, one each side of the jaw are perpendicular to a plane passing through the central axis of the chuck and parallel to each other. The rear end is turned so that in the fully open position it mates with the inside diameter of the body. This feature reduces the diameter needed to house the jaws.

2/ Nose: Has three jaw guides bored at 15 degrees to the central axis equally radially spaced. A central hole accommodates the tool and another central hole acts as bearing for the spindle.

3/ Body: Has a continuous form along its length to guide the drive plate and support it perpendicular to the central axis of the chuck. It also has ridges along its length to prevent the drive plate from rotating in the body.

4/ Spindle: Has a plain front bearing a section of left-handed thread to drive the drive plate, a rear thrust bearing, a plain bearing which runs in the rear bearing plate and a section of right-handed thread to screw into the driving machine.

5/ Drive plate: Has a central left-handed screw thread and three radial slots to engage the jaws. The root of these slots is at 15 degrees to the central axis to allow the jaws to be closer together at that point while leaving as much strength in the drive plate as possible. In addition three more slots engage with the body. The disc is deformed so the sections between the jaws are to the rear giving a greater effective length of support by the body. Also shown Figure 2.

6/ Rear bearing plate: Is a circular disc providing a plain bearing to locate the spindle and a thrust face to take the axial load from the screw thread during tightening. The other side takes the axial load from the hand wheel during loosening.

7/ Hand wheel: Has a nurled outer edge for grip and two axial slots to enable the chuck to be removed from the driving machine with a 'C' spanner. The centre is attached to the spindle.

Various changes could be made to this design without affecting the basic construction for example the rear bearing could be plain ball or taper roller. The drive plate could take a number of forms, for example a disc, spider or triangle. The male-female interaction of the drive plate and body could take a variety of forms, the male could be on the drive plate and the female on the body. The jaws and drive plate could also have a variety of male female configurations although in this instance the jaw would be the female as it is made from a basically round section. The drive to the chuck could be an internal or external taper or internal screw thread.

CLAIMS

1. A keyless self-tightening chuck consisting of a nose, jaws, spindle body, drive plate, rear-bearing plate and hand wheel in which the driving plate is prevented from rotating by a mechanical interaction between itself and the body.

2. A keyless self-tightening chuck as claimed in Claim 1 with jaws made from round bar where the driven end is tapered or reduced.

3. A keyless chuck as claimed in Claim 1 or Claim 2 where the drive plate has a constant area of screw thread as does a nut on a shaft.

4. A keyless chuck as claimed in any preceding claim with drive plate to jaw thrust area perpendic-

ular to the central axis and these same thrust areas inaccessable to ingress of foreign bodies except through running and sliding engineering tolerances.

5. A keyless chuck as claimed in any preceding claim with a mechanical interlock between the body and gripping wheel to prevent the chuck slackening if used in a reverse direction.

6. A keyless chuck as claimed in any preceding claim with a spindle passing from the driving machine to the tool holding void or area. So that if the tool is subjected to a high axial load compared with the torque thus causing the tool to bottom in the chuck the load is then transmitted directly to the driving machine without passing through any bearing.

Printed in the UK for HMSO, D8818935, 9/86, 7102.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.